

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 1. (Currently amended) A method for enhancing reliability,
2 availability and serviceability in a computer system by replacing a signal from a
3 failed sensor with an estimated signal derived from correlations with other
4 instrumentation signals in the computer system, comprising:

5 determining whether a sensor has failed in the computer system, wherein
6 an output signal from the sensor is applied to an input; and

7 applying if the sensor has failed, using an estimated signal to the input in
8 response to determining that the sensor has failed for the failed sensor in place of
9 the actual signal from the failed sensor during subsequent operation of the
10 computer system, whereby the computer system can continue operating without
11 the failed sensor;

12 wherein the estimated signal is derived from correlations with other
13 instrumentation signals that include at least one of:

14 a signal associated with an internal performance parameter;

15 a signal associated with a physical performance parameter;

16 and

17 a signal associated with a canary performance parameter in

18 the computer system.

1 2. (Currently amended) The method of claim 1, wherein determining
2 whether the sensor has failed involves:

3 | ~~deriving an estimated signal for a sensor from correlations with other~~
4 | ~~instrumentation signals in the computer system; and~~
5 | comparing a the output signal from the sensor with the estimated signal to
6 | determine whether the sensor has failed.

1 | 3. (Currently amended) The method of claim 2, wherein comparing
2 | the output signal from the sensor with the estimated signal involves using
3 | sequential detection methods to detect changes in the relationship between the
4 | output signal from the ~~failed~~ sensor and the estimated signal.

1 | 4. (Original) The method of claim 3, wherein the sequential detection
2 | methods include the Sequential Probability Ratio Test (SPRT).

1 | 5. (Original) The method of claim 1, wherein prior to determining
2 | whether the sensor has failed, the method further comprises determining
3 | correlations between instrumentation signals in the computer system, whereby the
4 | correlations can subsequently be used to generate estimated signals.

1 | 6. (Original) The method of claim 5, wherein determining the
2 | correlations involves using a non-linear, non-parametric regression technique to
3 | determine the correlations.

1 | 7. (Original) The method of claim 6, wherein the non-linear, non-
2 | parametric regression technique can include a multivariate state estimation
3 | technique.

1 | 8. (Original) The method of claim 5, wherein determining the
2 | correlations can involve using a neural network to determine the correlations.

1 9. (Canceled).

1 10. (Original) The method of claim 1, wherein the failed sensor can be
2 a sensor that has totally failed, or a sensor with degraded performance.

1 11. (Currently amended) A computer-readable storage medium storing
2 instructions that when executed by a computer cause the computer to perform a
3 method for enhancing reliability, availability and serviceability in a computer
4 system by replacing a signal from a failed sensor with an estimated signal derived
5 from correlations with other instrumentation signals in the computer system, the
6 method comprising:

7 determining whether a sensor has failed in the computer system, wherein
8 an output signal from the sensor is applied to an input; and

9 applying if the sensor has failed, using an estimated signal to the input in
10 response to determining that the sensor has failed~~for the failed sensor in place of~~
11 ~~the actual signal from the failed sensor during subsequent operation of the~~
12 ~~computer system,~~ whereby the computer system can continue operating without
13 the failed sensor;

14 wherein the estimated signal is derived from correlations with other
15 instrumentation signals that include at least one of:

16 a signal associated with an internal performance parameter;

17 a signal associated with a physical performance parameter;

18 and

19 a signal associated with a canary performance parameter.~~in~~

20 ~~the computer system.~~

1 12. (Currently amended) The computer-readable storage medium of
2 claim 11, wherein determining whether the sensor has failed involves:
3 ~~deriving an estimated signal for a sensor from correlations with other~~
4 ~~instrumentation signals in the computer system; and~~
5 comparing a the output signal from the sensor with the estimated signal to
6 determine whether the sensor has failed.

1 13. (Currently amended) The computer-readable storage medium of
2 claim 12, wherein comparing the output signal from the sensor with the estimated
3 signal involves using sequential detection methods to detect changes in the
4 relationship between the output signal from the ~~failed~~ sensor and the estimated
5 signal.

1 14. (Original) The computer-readable storage medium of claim 13,
2 wherein the sequential detection methods include the Sequential Probability Ratio
3 Test (SPRT).

1 15. (Original) The computer-readable storage medium of claim 11,
2 wherein prior to determining whether the sensor has failed, the method further
3 comprises determining correlations between instrumentation signals in the
4 computer system, whereby the correlations can subsequently be used to generate
5 estimated signals.

1 16. (Original) The computer-readable storage medium of claim 15,
2 wherein determining the correlations involves using a non-linear, non-parametric
3 regression technique to determine the correlations.

1 17. (Original) The computer-readable storage medium of claim 16,
2 wherein the non-linear, non-parametric regression technique can include a
3 multivariate state estimation technique.

1 18. (Original) The computer-readable storage medium of claim 15,
2 wherein determining the correlations can involve using a neural network to
3 determine the correlations.

1 19. (Canceled).

1 20. (Original) The computer-readable storage medium of claim 11,
2 wherein the failed sensor can be a sensor that has totally failed, or a sensor with
3 degraded performance.

1 21. (Currently amended) An apparatus that enhances reliability,
2 availability and serviceability in a computer system by replacing a signal from a
3 failed sensor with an estimated signal derived from other instrumentation signals
4 correlations with in the computer system, comprising:

5 a failure determination mechanism configured to determine whether a
6 sensor has failed in the computer system, wherein an output signal from the sensor
7 is applied to an input; and

8 a sensor replacement mechanism, wherein if the sensor has failed, the
9 sensor replacement mechanism is configured to apply, ~~use~~ an estimated signal to
10 the input ~~for the failed sensor in place of the actual signal from the failed sensor~~
11 ~~during subsequent operation of the computer system,~~ whereby the computer
12 system can continue operating without the failed sensor;

13 wherein the estimated signal is derived from correlations with other
14 instrumentation signals that include at least one of:

15 | a signal associated with an internal performance parameter;
16 | a signal associated with a physical performance parameter;
17 | and
18 | a signal associated with a canary performance parameter in
19 | the computer system.

1 | 22. (Currently amended) The apparatus of claim 21, wherein the
2 | failure determination mechanism is configured to:

3 | ~~derive an estimated signal for a sensor from correlations with other~~
4 | ~~instrumentation signals in the computer system; and to~~
5 | compare a the output signal from the sensor with the estimated signal to
6 | determine whether the sensor has failed.

1 | 23. (Currently amended) The apparatus of claim 22, wherein ~~while~~
2 | ~~comparing the signal from the sensor with the estimated signal,~~ the failure
3 | detection mechanism is configured to use sequential detection methods to detect
4 | changes in the relationship between the output signal from the ~~failed~~ sensor and
5 | the estimated signal.

1 | 24. (Original) The apparatus of claim 23, wherein the sequential
2 | detection methods include the Sequential Probability Ratio Test (SPRT).

1 | 25. (Original) The apparatus of claim 21, further comprising a
2 | correlation determination mechanism, which is configured to determine
3 | correlations between instrumentation signals in the computer system, whereby the
4 | correlations can subsequently be used to generate estimated signals.

1 26. (Original) The apparatus of claim 25, wherein the correlation
2 determination mechanism is configured to use a non-linear, non-parametric
3 regression technique to determine the correlations.

1 27. (Original) The apparatus of claim 26, wherein the non-linear, non-
2 parametric regression technique can include a multivariate state estimation
3 technique.

1 28. (Original) The apparatus of claim 25, wherein the correlation
2 determination mechanism is configured to use a neural network to determine the
3 correlations.

1 29. (Canceled).

1 30. (Original) The apparatus of claim 21, wherein the failed sensor can
2 be a sensor that has totally failed, or a sensor with degraded performance.